

27 January 2000

DDESB-IK

MEMORANDUM FOR ARMY BOARD MEMBER, COLONEL J. C. KING, USA  
NAVY BOARD MEMBER, CAPTAIN MIKE HERB, USN  
AIR FORCE BOARD MEMBER, MR. PAUL PRICE  
MARINE CORPS BOARD MEMBER, MR. JERRY MAZZA

SUBJECT: 319<sup>th</sup> Board Meeting

The Department of Defense Explosives Safety Board held its 319<sup>th</sup> meeting on 27 January 2000 and took the following actions:

a. The Board voted to approve the Navy proposed changes to DoD 6055.9-STD to include criteria for the High Performance Magazine as modified during the meeting. The approved changes (Attachment 1) are contained in:

- New acronym “HPM” in “ABBREVIATIONS AND/OR ACRONYMS”
- New paragraph C2.3.5, Chapter 2 (with follow-on paragraph re-numbering)
- New paragraphs C5.2.4 through C5.2.4.1.9, Chapter 5 (with follow-on renumbering)
- Revised paragraph C9.2.2.2, new paragraphs C9.2.2.8 and C9.3.1.4 (with follow-on renumbering), new Notes 9 & 10 to Table C9.T1, and revised Table C9.T5 (added HP Magazine columns) with new Notes 8-10, Chapter 9
- Revised definition for “Robust Munitions” and new definitions for “High Performance Magazine,” “Non-Robust Munitions,” and “Fragmenting Munitions,” AP1. APPENDIX 1, GLOSSARY.

The Board requested that the Joint Hazard Classification System (JHCS) be expanded by the Army to include the HPM Sensitivity Groups for all Hazard Division 1.1 and Hazard Division 1.2 ammunition.

b. The Board voted to approve the "DoD Working Group for Commercial and Non-DoD Explosives on DoD Property" proposal for criteria for non-DoD explosives activities on DoD installations as modified during the meeting. The approved changes (Attachment 2) are contained in:

- New paragraph 5.4.16, DoD Directive 6055.9
- New paragraph C1.2.4, Chapter 1, DoD 6055.9-STD

- New paragraphs C5.5.1.2.3 and C5.7 through C5.7.5, chapter 5, DoD 6055.9-STD.

c. The Board voted to address the Secretariat proposal to revise the external blast loads from an earth-covered magazine (ECM) specified in DoD 6055.9-STD by correspondence at a later date

The Board scheduled the next business meeting for 10-11 May 2000 and the next formal meeting (320<sup>th</sup>) for 18-19 October 2000.

/s/Daniel T. Tompkins  
DANIEL T. TOMPKINS  
Colonel, USAF  
Chairman

/s/J.C. King  
JAMES C. KING  
Colonel, USA  
Army Member

/s/Mike Herb  
MIKE HERB  
Captain, USN  
Navy Member

/s/Paul Price  
PAUL PRICE  
Air Force Member

/s/Jerry Mazza  
JERRY MAZZA  
Marine Corps Member

#### Attachments

As stated

cc:

Alternate Army Board Member, Mr. Gary Abrisz  
Alternate Navy Board member, Mr. Richard Eldridge  
Alternate Air Force Board Member, Colonel Randell Strauss  
Alternate Marine Corps Board Member, Colonel. Lief Larsen  
JCS (J-4-SMPED)  
DCMC (DCMC-OI)  
TRANSCOM (TCJ4-LT)  
USATCES/SIOAC-ES (Mr. Johnnie Cook)  
NOC/N711 (Mr. Richard T. Adams)

# PROPOSED CHANGES TO 6055.9-STD FOR HPM

Add to AL1: ABBREVIATIONS and/or ACRONYMS

HPM

High Performance Magazine

C2.3 Add:

C2.3.5. **High Performance Magazines.** The high performance magazine (HPM) identified in section C5.2.4, Chapter 5, with the minimum intermagazine separation distances required by Table C9.T5, provides virtually complete protection against propagation of explosion by blast, fragments, and fire. The story-2 transfer area is enclosed by pre-engineered metal building which may be severely damaged. The amount of damage to be expected at various pressure levels is described below. Unless special design requirements are imposed, access to ammunition items at less than K30 from a donor explosion may require extensive cleanup and a mobile crane.

Change/Renumber

C2.3.5.	to	C2.3.6.
C2.3.5.1.	to	C2.3.6.1.
C2.3.5.2.	to	C2.3.6.2.
C2.3.5.3.	to	C2.3.6.3.
C2.3.5.4.	to	C2.3.6.4.
C2.3.5.5.	to	C2.3.6.5.
C2.3.5.6.	to	C2.3.6.6.
C2.3.6.	to	C2.3.7.
C2.3.6.1.	to	C2.3.7.1.
C2.3.6.2.	to	C2.3.7.2.
C2.3.6.3.	to	C2.3.7.3.
C2.3.6.4.	to	C2.3.7.4.
C2.3.6.5.	to	C2.3.7.5.
C2.3.6.6.	to	C2.3.7.6.
C2.3.6.7.	to	C2.3.7.7.
C2.3.7.	to	C2.3.8.
C2.3.7.1.	to	C2.3.8.1.
C2.3.7.2.	to	C2.3.8.2.
C2.3.7.3.	to	C2.3.8.3.
C2.3.7.4.	to	C2.3.8.4.
C2.3.7.5.	to	C2.3.8.5.
C2.3.7.6.	to	C2.3.8.6.

ATTACHMENT 1

C.2.3.7.7.	to	C2.3.8.7.
C.2.3.8.	to	C2.3.9.
C.2.3.8.1.	to	C2.3.9.1.
C.2.3.8.2.	to	C2.3.9.2.
C.2.3.8.3.	to	C2.3.9.3.
C.2.3.8.4.	to	C2.3.9.4.
C.2.3.8.5.	to	C2.3.9.5.
C.2.3.8.6.	to	C2.3.9.6.
C.2.3.8.7.	to	C2.3.9.7.
C.2.3.8.8.	to	C2.3.9.8.
C.2.3.8.9.	to	C2.3.9.9.
C.2.3.9.	to	C2.3.10.
C.2.3.9.1.	to	C2.3.10.1.
C.2.3.9.2.	to	C2.3.10.2.
C.2.3.9.3.	to	C2.3.10.3.
C.2.3.9.4.	to	C2.3.10.4.
C.2.3.9.5.	to	C2.3.10.5.
C.2.3.9.6.	to	C2.3.10.6.
C.2.3.9.7.	to	C2.3.10.7.
C.2.3.10.	to	C2.3.11.
C2.3.10.1.	to	C2.3.11.1.
C2.3.10.2.	to	C2.3.11.2.
C2.3.10.3.	to	C2.3.11.3.
C2.3.10.4.	to	C2.3.11.4.
C2.3.10.5.	to	C2.3.11.5.
C2.3.10.6.	to	C2.3.11.6.
C2.3.11.	to	C2.3.12.
C2.3.11.1.	to	C2.3.12.1.
C2.3.11.2.	to	C2.3.12.2.
C2.3.11.3.	to	C2.3.12.3.
C2.3.11.4.	to	C2.3.12.4.
C2.3.12.	to	C2.3.13.

#### Change/Renumber

C5.2.4.	to	C5.2.5.
C5.2.5.	to	C5.2.6.
C5.2.5.1.	to	C5.2.6.1.
C5.2.5.2.	to	C5.2.6.2.
C5.2.5.3.	to	C5.2.6.3.
C5.2.5.4.	to	C5.2.6.4.

Add New C5.2.4.

C5.2.4. **High Performance Magazines (HPM)**. The primary objective of an HPM is to reduce the land encumbered by explosives safety quantity distances by limiting the maximum credible event (MCE) to a fraction of the total NEW stored in the HPM. Separation walls also provide protection against fire propagation between storage areas within the HPM. The HPM may be sited at the intermagazine distances as shown in Table C9.T5. Damage to assets depends on the donor NEW and the scaled separation distance K. Intermagazine distance provides nearly complete asset protection between HP Magazines (MCE = 60,000 lbs maximum). However, damage may occur to ammunition in an HPM to about K9 from a donor NEW > 350,000 lbs.

#### C5.2.4.1. **HP Magazine Storage Principles**

C5.2.4.1.1. Because of its construction, each storage cell of the HPM is treated as a separate magazine for the purposes of meeting DoD storage and compatibility requirements. For the purpose of storage within an HPM, all Hazard Division 1.1 and 1.2 ammunition is grouped into five HPM Sensitivity Groups as listed in the Joint Hazard Classification System (JHCS). Within a cell, all current mixing and storage compatibility regulations, as defined in Chapter 3, would apply.

C5.2.4.1.2. The five HPM Sensitivity Groups are:

- C5.2.4.1.2.1. HPM Sensitivity Group 1—robust or thick-skinned
- C5.2.4.1.2.2. HPM Sensitivity Group 2—non-robust or thin-skinned
- C5.2.4.1.2.3. HPM Sensitivity Group 3—fragmenting
- C5.2.4.1.2.4. HPM Sensitivity Group 4—cluster bombs/dispenser

munitions

C5.2.4.1.2.5. HPM Sensitivity Group 5- other – items that are prohibited or items for which HPM nonpropagation walls are not effective (per JHCS)

C5.2.4.1.3. The allowable explosives weight in cells adjacent to cells containing HPM Sensitivity Groups 1, 2, and 3 ammunition: 30,000 lbs in cell; 60,000 lbs in loading dock. The allowable explosives weight in cells adjacent to cells containing HPM Sensitivity Group 4 ammunition: 15,000 lbs in cell (side – side); 60,000 lbs in loading dock. (See High Performance Magazine Definitive Drawings: NFESC 99220001-99220012.)

C5.2.4.1.4 When HPM Sensitivity Groups are mixed, the most sensitive group controls the allowable explosives weight in an adjacent cell. When HD1.3, 1.4 and 1.6 are stored with HD1.1 or 1.2, the sensitivity groups of the HD1.1 and 1.2 control the storage requirements for explosives safety.

C5.2.4.1.5. For the purpose of assigning HPM Sensitivity Groups, an item should be placed into Group 1 when any two of the following criteria are met:

- C5.2.4.1.3.1. explosive weight/empty case weight < 1
- C5.2.4.1.3.2. case thickness > 0.4 inches
- C5.2.4.1.3.3. case thickness/NEW<sup>1/3</sup> > 0.05 in/lb<sup>1/3</sup>

C5.2.4.1.6. If an item does not meet the criteria shown above for Group 1 and it is not a candidate for Group 4 (cluster bombs/dispenser munitions), then, it should be considered for Group 2.

C5.2.4.1.7. Group 3 items have cases designed for fragmentation—items with pre-formed fragment warhead, scored cases, continuous rod warheads, etc. These items are usually air to air missile warheads.

C5.2.4.1.8. Items are assigned to Group 5 because of their sensitivity. Either it is known that the item can be very sensitive or the sensitivity of the item has not been established.

C5.2.4.1.9. Item specific testing and/or analyses can and should be used to change the HPM sensitivity group of an item. .

Change:

C9.2.2.2. The quantity of explosives in a magazine, operating building, or other explosives site shall be considered the net explosive weight of the controlling class of explosives contained therein (the class requiring the greatest separation). For the High Performance Magazine the net explosive weight, NEW, for determining separation distances, is based on the maximum credible event, MCE. The MCE is the sum of the contents of an individual open cell and the loading dock, rather than the aggregate NEW for the entire magazine.

Add C9.2.2.8.

C9.2.2.8. When computing safe separation distances for the High Performance Magazine, the net explosive weight used in the calculations is the maximum credible event, MCE, that could occur during ammunition transfer. The MCE is determined by adding the NEW in an individual cell to the NEW at the loading dock. Safe separation distances are calculated using the MCE of the High Performance Magazine. The MCE for the HPM shall not exceed 60,000 pounds.

Add C9.3.1.4.

C9.3.1.4 **Intraline Distance from HP Magazines.** Test results show that the earth-bermed HPM attenuates pressures relative to the unconfined surface burst configuration. The attenuation is similar to that shown for an earth-covered magazine in C9.3.1.3. The values shown in Table C9.T4 for the front exposure also apply to the front of the HPM. The values shown in Table C9.T4 for the side exposure also apply to the side and rear exposures of the HPM. The definition of “front” for earth-covered magazines (see C9.3.1.4.1) also applies to the HPM.

**Table C9.T1. Hazard Division 1.1 Inhabited Building and Public Traffic Route Distances.**  
(See Notes)

Net Explosive Weight (NEW) lbs	Distance in Feet to Inhabited Building From:				Distance in Feet to Public Traffic Route From:			
	Earth-Covered			Other PES	Earth-Covered			Other PES
	Magazine				Magazine			
	Front	Side	Rear		Front	Side	Rear	
Col 1	Col 2 <sup>1,8,9</sup>	Col 3 <sup>1,8</sup>	Col 4 <sup>2,8</sup>	Col 5 <sup>3</sup>	Col 6 <sup>4,8,10</sup>	Col 7 <sup>5,8</sup>	Col 8 <sup>6,8</sup>	Col 9 <sup>7</sup>
1	500	250	250	1,250	300	150	150	750
2	500	250	250	1,250	300	150	150	750
5	500	250	250	1,250	300	150	150	750
10	500	250	250	1,250	300	150	150	750
20	500	250	250	1,250	300	150	150	750
30	500	250	250	1,250	300	150	150	750
40	500	250	250	1,250	300	150	150	750
50	500	250	250	1,250	300	150	150	750
100	500	250	250	1,250	300	150	150	750
150	500	250	250	1,250	300	150	150	750
200	700	250	250	1,250	420	150	150	750
250	700	250	250	1,250	420	150	150	750
300	700	250	250	1,250	420	150	150	750
350	700	250	250	1,250	420	150	150	750
400	700	250	250	1,250	420	150	150	750
450	700	250	250	1,250	420	150	150	750
500	1,250	1,250	1,250	1,250	750	750	750	750
600	1,250	1,250	1,250	1,250	750	750	750	750
700	1,250	1,250	1,250	1,250	750	750	750	750
800	1,250	1,250	1,250	1,250	750	750	750	750
900	1,250	1,250	1,250	1,250	750	750	750	750
1,000	1,250	1,250	1,250	1,250	750	750	750	750
1,500	1,250	1,250	1,250	1,250	750	750	750	750
2,000	1,250	1,250	1,250	1,250	750	750	750	750
3,000	1,250	1,250	1,250	1,250	750	750	750	750
4,000	1,250	1,250	1,250	1,250	750	750	750	750
5,000	1,250	1,250	1,250	1,250	750	750	750	750
6,000	1,250	1,250	1,250	1,250	750	750	750	750
7,000	1,250	1,250	1,250	1,250	750	750	750	750
8,000	1,250	1,250	1,250	1,250	750	750	750	750
9,000	1,250	1,250	1,250	1,250	750	750	750	750
10,000	1,250	1,250	1,250	1,250	750	750	750	750
15,000	1,250	1,250	1,250	1,250	750	750	750	750
20,000	1,250	1,250	1,250	1,250	750	750	750	750
25,000	1,250	1,250	1,250	1,250	750	750	750	750
30,000	1,250	1,250	1,250	1,250	750	750	750	750
35,000	1,250	1,250	1,250	1,310	750	750	750	785
40,000	1,250	1,250	1,250	1,370	750	750	750	820
45,000	1,250	1,250	1,250	1,425	750	750	750	855
50,000	1,290	1,290	1,250	1,475	775	775	750	995
55,000	1,330	1,330	1,250	1,520	800	800	750	910
60,000	1,370	1,370	1,250	1,565	820	820	750	940
65,000	1,405	1,405	1,250	1,610	845	845	750	965
70,000	1,440	1,440	1,250	1,650	865	865	750	990

**Table C9.T1. Hazard Division 1.1 Inhabited Building and Public Traffic Route Distances.**  
(See Notes)

Net Explosive  Weight (NEW)  lbs	Distance in Feet to Inhabited Building From:				Distance in Feet to Public Traffic Route From:			
	Earth-Covered			Other  PES	Earth-Covered			Other  PES
	Magazine				Magazine			
	Front	Side	Rear		Front	Side	Rear	
Col 1	Col 2 <sup>1,8,9</sup>	Col 3 <sup>1,8</sup>	Col 4 <sup>2,8</sup>	Col 5 <sup>3</sup>	Col 6 <sup>4,8,10</sup>	Col 7 <sup>5,8</sup>	Col 8 <sup>6,8</sup>	Col 9 <sup>7</sup>
75,000	1,475	1,475	1,250	1,685	885	885	750	1,010
80,000	1,510	1,510	1,250	1,725	905	905	750	1,035
85,000	1,540	1,540	1,250	1,760	925	925	750	1,055
90,000	1,570	1,570	1,250	1,795	940	940	750	1,075
95,000	1,595	1,595	1,250	1,825	960	960	750	1,095
100,000	1,625	1,625	1,250	1,855	975	975	750	1,115
110,000	1,740	1,740	1,290	1,960	1,045	1,045	770	1,175
120,000	1,855	1,855	1,415	2,065	1,110	1,110	850	1,240
125,000	1,910	1,910	1,480	2,115	1,165	1,165	890	1,270
130,000	1,965	1,965	1,545	2,165	1,180	1,180	925	1,300
140,000	2,070	2,070	1,675	2,255	1,245	1,245	1,005	1,355
150,000	2,175	2,175	1,805	2,350	1,305	1,305	1,085	1,410
160,000	2,280	2,280	1,935	2,435	1,370	1,370	1,160	1,460
170,000	2,385	2,385	2,070	2,520	1,430	1,430	1,240	1,515
175,000	2,435	2,435	2,135	2,565	1,460	1,460	1,280	1,540
180,000	2,485	2,485	2,200	2,605	1,490	1,490	1,320	1,565
190,000	2,585	2,585	2,335	2,690	1,550	1,550	1,400	1,615
200,000	2,680	2,680	2,470	2,770	1,610	1,610	1,480	1,660
225,000	2,920	2,920	2,810	2,965	1,750	1,750	1,685	1,780
250,000	3,150	3,150	3,150	3,150	1,890	1,890	1,890	1,890
275,000	3,250	3,250	3,250	3,250	1,950	1,950	1,950	1,950
300,000	3,345	3,345	3,345	3,345	2,005	2,005	2,005	2,005
325,000	3,440	3,440	3,440	3,440	2,065	2,065	2,065	2,065
350,000	3,525	3,525	3,525	3,525	2,115	2,115	2,115	2,115
375,000	3,605	3,605	3,605	3,605	2,165	2,165	2,165	2,165
400,000	3,685	3,685	3,685	3,685	2,210	2,210	2,210	2,210
425,000	3,760	3,760	3,760	3,760	2,250	2,250	2,250	2,250
450,000	3,830	3,830	3,830	3,830	2,300	2,300	2,300	2,300
475,000	3,900	3,900	3,900	3,900	2,340	2,340	2,340	2,340
500,000	3,970	3,970	3,970	3,970	2,380	2,380	2,380	2,380

Notes for table C9.T1.:

1 Bases for Columns 2 and 3 distances:

1-45,000 lbs - debris hazard - lesser distances permitted if proved sufficient to limit hazardous debris to 1/600 ft<sup>2</sup>. Formula  $d = 35W^{1/3}$  (blast overpressure) may be used if fragments and debris are absent.

45,000-100,000 lbs - blast overpressure hazard. Computed by formula  $d = 35W^{1/3}$ .

100,000-250,000 lbs - blast overpressure hazard. Computed by formula  $d = 0.3955W^{0.7227}$ .

250,000 lbs and above - blast overpressure hazard. Computed by formula  $d = 50W^{1/3}$ .

2 Bases for Column 4 distances:

1-100,000 lbs - debris hazard - lesser distances permitted if proved sufficient to limit hazardous debris to 1/600 ft<sup>2</sup>. Formula  $d = 25W^{1/3}$  (blast overpressure) may be used if fragments and debris are absent.

100,000-250,000 lbs - blast overpressure hazard. Computed by formula  $d = 0.004125W^{1.0898}$ .



- 250,000 lbs and above - blast overpressure hazard. Computed by formula  $d = 50W^{1/3}$ .
- 3 Bases for Column 5 distances:  
 1-30,000 lbs - fragments and debris hazard. Lesser distances permitted as follows (see subparagraph C2.5.2.3.1. of Chapter 2): (a) thin-cased ammunition and bulk explosives with NEW to 100 lbs - 670 ft. (b) Bare explosives in the open, distances computed by formula  $d = 40W^{1/3}$ . Distances other than 1,250 ft. to be used when required by table C9.T2.  
 30,000-100,000 lbs - blast overpressure hazard. Computed by formula  $d = 40W^{1/3}$ .  
 100,000-250,000 lbs - blast overpressure hazard. Computed by formula  $d = 2.42W^{0.577}$ .  
 250,000 lbs and above - blast overpressure hazard. Computed by formula  $d = 50W^{1/3}$ .
  - 4 Column 6 distances have the same hazard bases and are equal to 60 percent of Column 2 distances.
  - 5 Column 7 distances have the same hazard bases and are equal to 60 percent of Column 3 distances.
  - 6 Column 8 distances have the same hazard bases and are equal to 60 percent of Column 4 distances.
  - 7 Column 9 distances have the same hazard bases and are equal to 60 percent of Column 5 distances.
  - 8 Distances for NEWs between 30,000 and 250,000 lbs apply only for earth-covered magazines that are 26 ft. wide and 60 ft. long, or larger. For smaller earth-covered magazines, use other PES distances of Columns 5 or 9.
  - 9 Column 2 Inhabited Building Distances apply to all directions from High Performance Magazines. The maximum credible event in the HPM is used as the NEW (Column 1). The limit on the design MCE in an HPM is 60,000 lbs.
  - 10 Column 6 Public Traffic Route Distances apply to all directions from High Performance Magazines. The maximum credible event in the HPM is used as the NEW (Column 1). The limit on the design MCE in an HPM is 60,000 lbs.

**Table C9.T5. Intermagazine Hazard Factors and Distances for Hazard Division 1.1**

Use Part A of this table to find the hazard factor, K, corresponding to the type of PES and ES. Use the column for this hazard factor in Part B to determine the appropriate distance for the next explosive weight in the PES.

Legend: S – Side; R – Rear; F – Front; B –barricaded; U – Unbarricaded

ECM – Earth-covered Magazine; AG – Aboveground; HPM – High Performance Magazine;

PES – Potential Explosion Site; ES – Exposed Site

Part A – Hazard Factors (K)<sup>1</sup>

FROM PES → TO ES ↓		ECM				AG Magazine <sup>3</sup>		Modules and/or Cells	HP Magazine <sup>8</sup>	
		S	R	F(B)	F(U)	B	U	B or U	S,R	F <sup>9</sup>
ECM <sup>2</sup> , (7 Bar)	S	1.25	1.25	2.75	2.75	4.5	4.5	4.5	1.25	2.75
	R	1.25	1.25	2	2	4.5	4.5	4.5	1.25	2
	FU	2.75	2	6	6	6	6	6	2.75	6
	FB <sup>4</sup>	2.75	2	4.5	6	4.5	6	6	2.75	6
ECM <sup>2</sup> , (3 Bar)	S	1.25	1.25	2.75	2.75	6	6	6	1.25	2.75
	R	1.25	1.25	2	2	6	6	6	1.25	2
	FU	4.5	4.5	9	9	6	9	9	4.5	9
	FB <sup>4</sup>	4.5	4.5	6	6	6	6	6	4.5	6
ECM <sup>2</sup> , (Undefined)	S	1.25 <sup>5</sup> 2 <sup>6</sup>	1.25 <sup>5</sup> 2 <sup>6</sup>	4.5 <sup>5</sup> 6 <sup>6</sup>	4.5 <sup>5</sup> 6 <sup>6</sup>	6	6	6	1.25	4.5
	R	1.25	1.25	2	2	6	6	6	1.25	2
	FU	6	6	6	11	6	11	6	6	11
	FB <sup>4</sup>	6	6	6	6	6	6	6	6	6
AG Magazine <sup>3</sup>	U	6	6	6	11	6	11	6	6	11
	B	6	6	6	6	6	6	6	6	6
Modules and/or cells	B	1.25	1.25	6	6	6	6	1.1 <sup>7</sup>	1.25	6
HP Magazine <sup>8</sup>	S,R,F <sup>10</sup>	1.25	1.25	2.75	2.75	4.5	4.5	4.5	1.25	2.75

Notes:

- 1 Except as noted, K-factors for ECMs and AG Magazines are applicable for NEW up to 500,000 lb. in the PES. NEW in a Module and/or Cell is limited to 250,000 lb.
- 2 Descriptions of the earth-covered magazines are in subsection C5.2.1 of Chapter C5.
- 3 Aboveground magazines are all types of above grade (not earth-covered) magazines or storage pads.
- 4 Those barricades serve to mitigate both fragments and overpressure hazards. See Chapter 5, section C5.3. for their requirements.
- 5 Use this K-factor for NEW in PES up to 250,000 lb.
- 6 Use this K-factor for NEW in PES above 250,000 lb.
- 7 Modules and/or Cells are defined in Chapter 5, subsection C5.2.2.
- 8 A description of the HPM is in subsection C5.2.4. The MCE in the HPM is 60,000 lbs.
- 9 The unbarricaded front (entrance to Loading Dock) is a factor when the HPM is the PES because the MCE includes explosives at the loading dock. The K-factors have been determined accordingly.
- 10 The storage areas in the HPM are barricaded on all sides and protected by a reinforced concrete cover. All directions are therefore considered to be Side, S, orientations when it is the ES.

## Changes to Appendix A. Glossary (renumber accordingly):

### Delete:

**AP.1.1.1.79. Robust Munitions.** These are munitions having a ratio of the explosive weight to empty case weight less than 1.00 and a nominal wall thickness of at least 0.4 inches. Examples of robust ammunition includes MK 80 series bombs, M107 projectiles, Tomahawk and Harpoon penetration warheads and 20, 25, and 30 mm cartridges. Examples of non-robust ammunition include CBU's, torpedo warheads, underwater mines, and TOW, Hellfire, Sparrow, and Sidewinder missiles. Unless otherwise noted, all air-to-air missile warheads are defined as non-robust.

### Add:

**High Performance Magazine (HP Magazine, HPM).** The HP Magazine (HPM) is an earth-bermed, 2-story, box-shaped structure. Story-1 contains the ammunition storage areas and loading dock. Each storage cell has earth-bermed or nonpropagation walls on all four sides and a reinforced concrete cover. Story-2 is a lightweight pre-engineered metal building that provides environmental protection for the ammunition transfer area. The nonpropagation walls and storage area covers are designed to limit the maximum credible event, MCE, in the HPM to 60,000 lbs. The MCE, rather than NEW, is used to calculate safe separation distances.

**Non-Robust Munitions.** Those items that do not meet the definition of Robust or Fragmenting munitions. Examples include torpedo warheads, underwater mines, most CBU's, and TOW and Hellfire missiles.

**Robust Munitions.** These are munitions that meet two of the following three criteria: (1) have a ratio of the explosive weight to empty case weight less than 1.00, (2) have a nominal wall thickness of at least 0.4 inches, and (3) have a case thickness/ $NEW^{1/3} > 0.05 \text{ in/lb}^{1/3}$ . The following cartridges are, by definition, robust: 20 mm, 25 mm, and 30 mm. Other examples of robust ammunition include MK 80 series bombs, M107 projectiles, Tomahawk and Harpoon penetration warheads.

**Fragmenting Munitions.** Items that have cases that are designed to fragment in a specified manner. Examples include continuous rod warheads, items with scored cases and items that contain pre-formed fragments. Items that fit this definition are usually air-to-air missile warheads such as Sparrow and Sidewinder.

## **Non-DoD Explosives Activities on DoD Installations**

### **Proposed change to DoD 6055.9**

C5.4.16. (Added) Authorize Non-DoD explosives activities to be conducted on DoD installations when the risk to the DoD mission has been evaluated and found acceptable, and the activities meet the criteria of 10 USC, Section 2692 (reference xx).

### **Proposed Changes to 6055.9-STD**

C1.2.4. (Added) Evaluate non-DoD explosives siting submissions on DoD installations only to insure compliance with DoD explosives safety standards to non-commercial (DoD) exposures and in accordance with Table C5.Tx.

C5.5.1.2.3. (Added) Non-DoD explosives shall be separated from other non-DoD and DoD exposures according to Table C5.Tx.

### **C5.7. (Added) Criteria for Non-DoD Explosives Activities on DoD Installations**

C5.7.1. The non-DoD activity will be evaluated based on intermagazine distance between multiple PESs to insure non-propagation. Where intermagazine distance is not met, then the non-DoD sites will be added to determine the applicable intermagazine distance or inhabited building distance to DoD sites.

C5.7.2. In Table C5.Tx, “Check for IM” means if intermagazine distance is not maintained between each PES, explosives quantities will be totaled.

C5.7.3. IBD will be determined based on this Standard.

C5.7.4. The DoD site approval for non-DoD operations and storage will be limited to a “footprint” only. The footprint will be the area included by the IBD arc(s) determined.

C5.7.5. Review of building design, lightning protection, etc, is not necessary unless design features are used to reduce the IBD arc.

## ATTACHMENT 2

TABLE C5.Tx

## CRITERIA FOR NON-DOD EXPLOSIVES ACTIVITIES ON DOD INSTALLATIONS

To → From ↓	Non-DoD Storage	DoD/Joint Storage	Non-DoD Operations	DoD Operations	Shared Launch Facilities	DoD Non-Explosives Facilities/Operations Non-Related
Non-DoD Storage	Check for IM	IM	Check for IM	IBD	IBD	IBD
Non-DoD Operations	Check for IM	IBD	Check for IM	IBD	IBD	IBD
Shared Launch Facilities	IBD	IBD	IBD	IBD	IL	IBD
DoD/Joint Storage	IM	IM	IBD	IL	IBD	IBD
DoD Operations	IBD	IL	IBD	IL	IBD	IBD

## Definitions

**DoD Operations/Storage:** Explosives operations conducted by DoD, or other federal agency, under DoD oversight, procedure, or control and in accordance with the explosives safety standards of DoD 6055.9-STD. This term is applicable only to DoD and federal explosives operations, and to non-DoD commercial enterprises directly supporting DoD and federal explosives contractual efforts.

**Non-DoD Operations/Storage:** Explosives operations/storage conducted on DoD property in accordance with only this table, BATF, FAA or other federal, state, and local explosives safety requirements. Under these type operations, DoD will be responsible only for insuring IM standards are met as outlined in explosives site plan submissions. This does not constitute “DoD oversight” as intended in the above definition of “DoD Operations/Storage.”

**Shared Launch Facility:** Any space or orbital launch facility that supports both DoD and non-DoD launch services and operations, as determined by service involved or by mutual agreement when multiple DoD military services are involved.

**Joint Storage:** DoD/non-DoD explosives storage under DoD control.